DETAILED DESCRIPTION OF THE
HIGHWAY IMPROVEMENT OPTION METHODOLOGY

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Highway Improvement Option Methodology

For highway travel, the level of improvement necessary to serve the travel demand is represented in terms of additional through lanes of capacity and the associated improvements to provide these lanes such as interchange reconfiguration, ramp widening, and cross street and intersection widening. For this analysis, highway improvement options were developed to accommodate the representative intercity travel demand only, and does address non-intercity demand that would be attracted to the facility for other local trips (i.e., latent demand) or as a relief to peak period congestion. These associated infrastructure improvements are necessary to provide the lane additions identified and will be accounted for in defining the cost and impact of the improvements identified. In addition, significant improvements to the local and regional roadway networks would also be necessary to support the additional capacity on the intercity routes. These improvements and their associated impacts will be addressed in qualitative terms in the analysis of the system alternatives.

The No Project Alternative (see Chapter 2) defines an intercity highway system represented by the interstate and state highway facilities in the geographic area serving the same intercity travel markets as the proposed high-speed train system. These highways are illustrated in Appendix 2-A of the Program EIR/EIS. In order to assess the magnitude of the demand to be served by this intercity highway system, the total intercity demand is first converted to total vehicle trips. This is accomplished by dividing the total annual intercity demand between major city pairs throughout the study area by an average auto occupancy factor (number of people per auto) to generate annual vehicle trips.

An average vehicle occupancy rate of 2.40 passengers per vehicle was assumed which is based on the independent ridership and revenue forecasts prepared for the California High Speed Rail Authority.[1] This estimate assumes a weighted average of work and non-work trip average vehicle occupancy rates of 1.9 and 2.6, respectively. The annual vehicle trips are then divided into daily trips (annual trips/365 days per year) and peak hour trips (assuming an average peak hour factor of 7%), which is also consistent with the method and assumptions of the independent ridership and revenue forecasts.[2] Average daily long-distance commute trips were also forecasted[3]; the portion (40%) of these trips assumed to occur in the peak hour was added to complete the estimate of representative demand on the intercity highway system. An average occupancy rate of 1.25 passengers/vehicle was applied to the long distance commute trips. The peak hour trips in a given corridor are then divided by capacity per lane to estimate the number of lanes that would accommodate the projected travel demand. These calculations are presented in a worksheet included in Table 2-F-1.[3]

The additional lanes are then assigned to highway facility segments serving the same general demand corridors. It is assumed that an additional 50 peak-hour trips would be the minimum number of trips to add a single new lane. These additional lanes are assumed to be filled to capacity with a combination of representative intercity demand and other (i.e., local) trips. Because the new lanes cannot be reserved

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[1] "Independent Ridership and Passenger Revenue Projections for High Speed Rail Alternatives in California, Draft Final Report," January 2000, prepared for the California High Speed Rail Authority.

[i] ibid.

[3] Lane capacity assumes 2300 passenger cars per hour per lane maximum service flow rate under ideal conditions for 6+ lane freeways according to the *Highway Capacity Manual*, 1994.

exclusively for representative intercity demand trips, it is assumed that other trips will take advantage of the additional capacity. The hypothetical improvement options (the extent of widening required to accommodate demand for each highway facility) are presented in Chapter 2, Table 2.5-1. This level of improvement is designed to address the forecasted total intercity travel demand of 68 million annual passengers, and translates into additional lanes on the No Project Alternative highway facility segments for the year 2020. The improvement options represent extensive expansion of the existing intercity highway facilities.

Table 2-F-1
Highway Travel Demand Distribution Table

FACTORS	
Auto Occupancy	2.40
VOR for Long Distance Commuter	1.25
Daily Factor	365
Peak Hour Factor	0.07
Capacity Per Lane	2300

MODAL ALTERNATIVE
HIGHWAY COMPONENT

2020 SENSITIVITY ANALYSIS SCENARIO - AUTO DIVERSION
(AUTO DIVERSION WITH 37% INDUCED RIDERSHIPS)

Annual Trips = Total Ridership / Auto Occupancy
Daily Trips = Annual Trips / Daily Factor
Peak Hour Trips = Daily Trips * Peak Hour Factor
Additional Lanes = Peak Hour Trips / Capacity Per Lane

Route #	K-Impax Link #	Segment	From	To	Current Hwy Lanes	Total Ridership	Annual Trips	Daily Trips	Peak Hour Trips	Commuter Ridership	Commuter Peak Hour Trips	Additional Lanes
Bay Area to Merced												
1	44	101 Fwy	San Francisco	San Francisco Airport		1,736,614	723,589	1,982	139	5,200	1,664	1
	46	101 Fwy	San Francisco Airport	Redwood City		928,336	386,807	1,060	74	5,150	1,648	1
	47	101 Fwy	Redwood City	880 Fwy		258,446	107,686	295	21	2,650	848	1
	48	880 Fwy	101 Fwy	San Jose		975,210	406,338	1,113	78	2,650	848	1
	49	101 Fwy	San Jose	Gilroy		2,130,284	887,618	2,432	170	250	80	1
	51	101 Fwy	Gilroy	152 Fwy		2,228,740	928,642	2,544	178	100	32	1
	53	152 Fwy	101 Fwy	5 Fwy		2,105,958	877,483	2,404	168	100	32	1
	55, 57	152 Fwy	5 Fwy	99Fwy		505,542	210,643	577	40	100	32	1
2	34, 33	80 Fwy	San Francisco	880 Fwy		4,076,722	1,698,634	4,654	326			1
	35	80 Fwy	880 Fwy	5 Fwy (via 238)		816,672	340,280	932	65			1
	36	880 Fwy	80 Fwy	238 Fwy		5,073,432	2,113,930	5,792	405			1
	41	580 Fwy	880 Fwy (via I-238)	5 Fwy		6,212,326	2,588,469	7,092	496			1
	42	880 Fwy	580 Fwy	Fremont/Newark		1,354,930	564,554	1,547	108			1
	45	880 Fwy	Fremont/Newark	101 Fwy		716,764	298,652	818	57			1
Subtol						29,119,976	12,133,323	33,242	2,327	16,200	5,184	14
Sacramento to Bakersfield												
	38	5 Fwy	80 Fwy	Stockton		2,747,576	1,144,823	3,137	220			1
	40	5 Fwy	Stockton	580 Fwy/120 Fwy		3,449,728	1,437,387	3,938	276			1
	43	5 Fwy	580 Fwy/120 Fwy	152 Fwy		6,290,464	2,621,027	7,181	503			1
	56	5 Fwy	152 Fwy	99 Fwy		7,435,308	3,098,045	8,488	594			1
	61	99 Fwy	5 Fwy	58 Fwy		2,487,070	1,036,279	2,839	199			1
2	122	5 Fwy/99 Fwy	Sacramento	120 Fwy		647,794	269,914	739	52			1
	124	99 Fwy	120 Fwy	Modesto		2,084,138	868,391	2,379	167			1
	50	99 Fwy	Modesto	Merced		2,050,472	854,363	2,341	164			1
	52	99 Fwy	Merced	152 Fwy		1,888,940	787,058	2,156	151			1
	58	99 Fwy	152 Fwy	Fresno		2,013,762	839,068	2,299	161			1
	59	99 Fwy	Fresno	Tulare/Visalia		1,916,886	798,703	2,188	153			1
	60	99 Fwy	Tulare/Visalia	58 Fwy		1,900,630	791,929	2,170	152			1
Subtol						34,912,768	14,546,987	39,855	2,790	0		12
Bakersfield to Los Angeles												
1	62, 64	5 Fwy	99 Fwy	14 Fwy		9,922,378	4,134,324	11,327	793			1
	67	5 Fwy	14 Fwy	405 Fwy		9,912,820	4,130,342	11,316	792	7,560	2,419	2
	70	5 Fwy	405 Fwy	Burbank		9,200,476	3,833,532	10,503	735	7,560	2,419	2
	71, 75	5 Fwy	Burbank	LA Union Station		9,122,378	3,800,991	10,414	729	8,550	2,736	2
2	63, 65	58 Fwy/14 Fwy	99 Fwy	Palmdale		22,678	9,449	26	2		0	0
	66	14 Fwy	Palmdale	I-5		192,830	80,346	220	15	3,280	1,050	1
Subtol						38,373,560	15,988,983	43,805	3,066	26,950	8,624	8
Los Angeles - Orange County - San Diego												
1	76	5 Fwy	LA Union Station	10 Fwy		8,752,426	3,646,844	9,991	699	5,800	1,856	2
	80	5 Fwy	10 Fwy	Norwalk		5,458,310	2,274,296	6,231	436			1
	86	5 Fwy	Norwalk	Anaheim		5,205,560	2,168,983	5,942	416			1
	88	5 Fwy	Anaheim	Irvine		4,886,662	2,036,109	5,578	390			1
	89	5 Fwy	Irvine	405 Fwy		4,355,688	1,814,870	4,972	348			1
	92	5 Fwy	405 Fwy	78 Fwy		4,937,992	2,057,497	5,637	395			1
	93, 100	5 Fwy	78 Fwy	University Town Center		3,620,146	1,508,394	4,133	289			1
	95	5 Fwy	University Town Center	San Diego Airport (8 Fwy)		3,241,234	1,350,514	3,700	259			1
	97	8 Fwy	163 Fwy	San Diego Airport (5 Fwy)		3,241,235	1,350,515	3,700	259			
Subtol						43,699,253	18,208,022	49,885	3,492	5,800	1,856	9
Los Angeles - Riverside - San Diego												
1	79	10 Fwy	5 Fwy	E. San Gabriel Valley		4,016,388	1,673,495	4,585	321	5,800	1,856	1
	81	10 Fwy	E. San Gabriel Valley	Ontario Airport		3,059,410	1,274,754	3,492	244	5,450	1,744	1
	82	10 Fwy	Ontario Airport	15 Fwy		2,760,514	1,150,214	3,151	221	3,850	1,232	1
	126	10 Fwy	15 Fwy	215 Fwy		674,648	281,103	770	54	3,850	1,232	1
	127, 128	15 Fwy	10 Fwy	215 Fwy		2,085,866	869,111	2,381	167			1
	83	215 Fwy	Riverside	15 Fwy		674,648	281,103	770	54	3,850	1,232	1
	84	215 Fwy	10 Fwy	Riverside		287,286	119,703	328	23	3,700	1,184	1
	87	215 Fwy	15 Fwy	Temecula		2,373,152	988,813	2,709	190	3,700	1,184	1
	90	15 Fwy	Temecula	Escondido		2,282,688	951,120	2,606	182	40	13	1
	94	15 Fwy	Escondido	Mira Mesa		2,050,150	854,229	2,340	164	340	109	1
	96	15 Fwy	Mira Mesa	163 Fwy		490,094	204,206	559	39	355	114	1
	104, 98	15 Fwy/ 8 Hwy	163 Fwy	San Diego Airport		430,436	179,348	491	34			0
	102, 103, 105, 106, 107	163 Fwy	5 Fwy	8 Hwy		59,658	24,858	68	5	355	114	1
Subtol						21,244,938	8,852,058	24,252	1,698	31,290	10,013	12
Total						167,350,495	69,729,373	191,039	13,373	80,240	25,677	55

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